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ECONOMIC AND BUSINESS VIABILITY OF IT OUTSOURCING IN NORTH MACEDONIA

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ABSTRACT

As in the global economy, in North Macedonia, IT Outsourcing is becoming an important economic element through which the country has become a very attractive and competitive destination at the same time.

This study seeks to determine the contribution of the IT outsourcing sector to North Macedonia's GDP and to identify the companies within North Macedonia that provide IT outsourcing services to the domestic market. This study analyzes the economic and business sustainability of IT outsourcing in North Macedonia, focusing on factors influencing sector development and industry challenges. This study uses the technique of collecting data on salaries, number of employees and other characteristics of companies from various economic and business platforms in the country. Incorporating this information into the study allows for strategic recommendations to be made to all stakeholders, including investors, policymakers, and IT professionals. These recommendations aim to achieve sustainable economic and business practices and to enhance the approach and strategy of outsourcing within business models.

Key words: Economic Viability, Business Viability, IT Outsourcing, North Macedonia, Industry.

INTRODUCTION

In recent years, technological advances have gained popularity in the IT outsourcing market. Companies that provide IT Outsourcing services aim to expand their innovative capacity in order to maintain and improve their market position (GlobeNewswire, 2023).

The approach to communication and information search has recently undergone a drastic change by achieving cost reduction and entering the field of information search for IT Outsourcing, and this has happened as a result of the development of digital technology based on what is called the 'new economy' (Jolanta Słonec, 2019).

The positive impact of outsourcing in general is being noted by various countries around the world, where a report on the impact of outsourcing in Africa emphasizes that Africa has experienced significant economic development through job creation and technological advancements. The outsourcing sector offers growth opportunities for other sectors and enables African countries to participate in the global economy (Monitor, 2022). Its positive macroeconomic impact can be explained by the fact that money is being redirected to developing markets. Thus, capital flows that result in built production facilities or new jobs have the ability to affect the well-being or standard of living of a country and ensure long-term economic stability in those same countries by enabling a decrease in the unemployment rate and consequently an increase in gross domestic product (Dumitru-Alexandru Bodislav, 2023).

IT service management is regarded as an important topic in industry. In this regard, as far as North Macedonia is concerned one of the main factors of economic and business development and innovation is the Information Technology (IT) sector. In particular, IT Outsourcing, through its characteristics such as cost reduction and efficiency increase, has influenced companies to decide to transfer their technological activities to North Macedonia, the benefits of which are experienced by both North Macedonia and foreign companies that transfer functions. The advantages that identify North Macedonia are the qualified workforce, low operational costs, culture and strategic location, widely used English and many other factors that demonstrate the significant growth in this industry in North Macedonia.

As a result of the ease of doing business, a friendly atmosphere prevails in North Macedonia, which incorporates processes and policies that support innovation. According to "Doing Business 2022", North Macedonia ranks 17th globally in terms of ease of doing business, and this feature is characterized by simple and supportive government processes and a developed IT infrastructure (Eagle, 2023).

As highlighted in the report by (Invest, 2025), the advantages that make North Macedonia a desirable destination for performing technological functions through which the country has experienced economic and business growth in recent years are: Skilled Workforce, Competitive Labor Costs, Strong Telecommunication Infrastructure, Favorable Tax Environment, High-Quality Software and IT Services, Export-Oriented IT Sector, Access to EU Markets, Government Support, Strong Education System and Business-Friendly Environment.

Although North Macedonia is a small country in terms of population, it has produced a significant number of IT professionals in recent years, and its geographical position makes it a good place to consider foreign investment in this direction (Xhemo, 2020).

In order to better understand the factors that influence the performance of companies and the overall sustainability of the IT sector in North Macedonia, this study, through the addressed research questions, attempts to uncover the relationships between financial and operational variables through panel data. The questions addressed based on this purpose are as follows:

RQ1. What are the statistical characteristics and trends of the distribution of financial and operational indicators of companies during the years 2021-2023?

RQ2. Which variables have the ability to affect the overall profit of companies the most?

RQ3. Which model, Fixed Effects or Random Effects, is more appropriate for interpreting panel data?

THE STATE OF IT INDUSTRY IN NORTH MACEDONIA

The literature on IT Outsourcing suggests that this sector is significantly supporting innovation through strategic procurement. Developed country markets are accessed through investment in joint ventures that benefit all stakeholders. In this way, companies develop together and also share the costs of innovation proportionally and address common regulatory requirements (Pankowska, 2019). Through IT Outsourcing in various more developed countries, innovation is supported phenomenally, and it happens that the less developed country contracts the necessary knowledge, be it software, and benefits from research in more developed countries. As highlighted in this article, the company has the opportunity to engage in more complex projects through access to global talent and thereby benefit from the knowledge and experience of international professionals. In addition, the transfer of activities allows organizations to focus on their core activities, which can improve overall efficiency and innovation. The transfer of IT services offers scalability. Companies can quickly adapt their outsourcing arrangements to meet changing market demands (Mohammad Ikbāl Hossain, 2024).

As for the IT sector, this sector has contributed to North Macedonia gaining the title of a very strong IT Outsourcing development center through software developers produced by 9 universities in the country and also by the government support that has under its management over 150 foreign companies specialized in IT (Pavlovska, 2024).

In general, the impact of outsourcing in North Macedonia can be seen in several aspects, starting from the creation of new jobs to the overall social development, which has recently made North Macedonia known as a suitable place for the performance of these external services and this is for many reasons. As for the economic and social benefits, the American Chamber of Commerce in its 2015 research has listed these benefits, among which the possibility of employment for local labor force is highlighted (Ceneta Telak, 2024).

The support of the education system in North Macedonia, producing a well-educated workforce, where opportunities for acquiring foreign languages are offered, first of all English, then German and French, are one of the factors that has influenced the confidence of companies to enter the IT outsourcing sector where these language skills are one of the main criteria during employment in this sector (Gallimore, 2024). The Western Balkan countries are consistently experiencing growth in their IT sector workforce. This trend is projected to persist, positioning the IT sector to secure a notable presence in the international market. Such changes and increases come as a result of advances in education and technological advancements (Ameti, 2019). In a report provided by Masit, it is emphasized that one of the industries that has experienced the fastest growth is the outsourcing industry which has also brought an increase in the level of employment until 2018. The report emphasizes that according to the State Statistical Office, 10,200 people were employed in this sector in 2018, where 8,200 people were employed a year earlier. Almost half of the employees were positioned in computer programming and consulting (MASIT, 2019).

It is reported that in 2019, 1,234 companies were registered in the field of software and IT services, representing 2% of the total number of registered companies, and most of them are located in Skopje. The companies active in this sector have also registered a significant increase, with an increase of 55 percent from 2016 to 2019 or an average increase of 16 percent for the same period (Nikola Radovanovic, 2022). So, these companies mainly provide services such as software or website development, website design, mobile application design and development, project management, data analysis, maintenance, quality testing and many other services. In general, these companies have sufficient capacity to follow and handle various external projects ranging from the most common tasks to the most complex software tasks, problems and solutions (Pavlovska, 2024).

In North Macedonia, the technology ecosystem has experienced rapid expansion as a result of government support on the one hand and private investment on the other. Through various grants provided to startups in the IT sector, the country has focused on the IT sector, enabling foreign investors to carry out outsourcing contracts and operate successfully in this market (Technoperia, 2024).

Although North Macedonia has been facing a high level of unemployment for years, with an unemployment rate of 19 percent recorded in 2020, the situation is different in the IT industry. As reported by the Macedonian Chamber of Information and Communication Technology (MASIT), this industry (IT) is one of the fastest growing industries in the country. It is reported that in 2018, the IT industry recorded its contribution to GDP with 2.1 percent or 150 million euros. Due to the continuous growth in this industry, this contribution is expected to reach 288 million euros in 2022. Compared to a few years ago when the number of ICT companies was less than 1300, in 2020 the number of these companies increased to 1957, employing more than 15,000 professionals. In addition, Macedonian authorities have announced that they are expected to further abolish the personal income tax for the IT industry by 2023, in order to encourage young people to join this sector (Stojkovski, 2022).

This sector has registered growth of 2.5 percent to 8 percent in recent years, helping it to be highly sought after for foreign investments. This continuous growth has come as a result of a combination of several factors such as: Significant investments by the government and the telecommunications sector in IT; Continuous spending in the financial sector; Reduction in the prices of IT equipment; Reduction of VAT on IT equipment (Invest, 2025).

Companies in North Macedonia have identified several obstacles related to two aspects: competition for labor and access to finance for innovation and development. The report finds that every second company in North Macedonia faces the problem of competition for qualified labor, while 45 percent of companies express difficulties in accessing finance (Masit, 2020).

The Western Balkans in general, and North Macedonia in particular, have seen growth in the information and technology sector during the first half of 2022, and this growth has led to North Macedonia being considered an alternative destination for companies in the regions affected by the war in Ukraine. However, in the second half of 2022, this growth began to slow down, which came as a result of the economic environment in Western economies (Manev, 2023).

Business in general is facing economic difficulties, and the technology industry is certainly no exception. However, there are various regulatory incentives that have the ability to drive economic growth and innovation in the coming years. Technology companies should refocus their efforts by trying to improve certain functions such as supply operations, advance infrastructure, and pursue new opportunities (Silverglate, 2023).

METHODOLOGY AND DATA ANALYSIS

In this part of the paper, we describe, analyze and interpret the data collected through an in-depth statistical methodology through which the performance of IT companies in North Macedonia was assessed. The collected data is secondary data obtained from the Central Registry of the Republic of North Macedonia. These data are for three years 2021, 2022 and 2023 and we have collected over 100 records. We have selected a representative sample of IT companies in North Macedonia, with a focus on representing different regions, different sizes of companies and the type of work they perform. In this direction, the following variables were analyzed: revenue, profit, company capital, assets, and short-term liabilities, number of employees, gross salary and net salary. The analysis was done through the Stata statistical program, using descriptive statistics, 5-number summary analysis and Box Plots graphs.

Table 1. Descriptive statistics

. summarize year income profit capital assets liabilities employees gsalary nsalary

Variable	Obs	Mean	Std. Dev.	Min	Max
year	353	2022.003	.8170713	2021	2023
income	353	8.38e+07	2.06e+08	307500	1.70e+09
profit	353	6707474	1.73e+07	-2.59e+07	1.25e+08
capital	353	1005817	3402809	158100	4.43e+07
assets	353	5.09e+07	1.21e+08	96778	8.78e+08
liabilities	353	1.49e+07	6.10e+07	2622	7.47e+08
employees	353	22.33144	46.88369	1	419
gsalary	353	74803.02	45967.36	12853.75	242512.5
nsalary	353	45000.34	27966.16	8039.42	143834.8

Table 1 presents some of the main statistics for the relevant variables analyzed regarding the characteristics of IT sector companies in North Macedonia, which include income, profit, capital, assets, and liabilities, number of employees, gross salary and net salary for three years. As we can see, we have a total of 353 observations, where the average shows that the samples are mainly from the years 2021, 2022 and 2023 with a slight average from 2022. Regarding the years, the standard deviation is small, which means that the variation between the sample years is small.

The value of the average income, although high, and also a high standard deviation, indicates the existence of a very pronounced difference between companies. This may be because some companies have very low income, compared to some companies that have recorded astronomical income, which may be market leaders. Such a very wide distribution can be perceived as an uncertainty of the industry, since large companies may have an impact on covering the reality for other smaller companies. For most industries, it is common for the average profit to be lower than income, and with a large standard deviation, it means that some companies have reported large losses, so there is a large difference in the ability of companies to generate significant profits. This situation is very worrying for industry in general because such losses may be the result of the influence of several external factors such as the economic crisis, high and strong competition, and poor cost management.

The high value of the standard deviation of capital shows us that there is high uncertainty in the capital of companies, causing some companies to possess very small capital, not having the ability to fight in cases of financial crises, while on the other hand, firms with large capital may be sensitive to increased competition.

The liabilities of companies, with a high average and a high standard deviation value, indicate the existence of high variability between companies, where there are companies with very low liabilities, but there are also companies that have unaffordable financial liabilities, and this represents a potential risk for the bankruptcy of companies.

Regarding employees in this sector, there is variability in the number of employees among companies, where some companies have a very small number of employees, and this is an indicator that the companies are poor in resources, while some companies with a large number of employees have the ability to develop and increase resources and capture a large share of the market.

The high difference in gross salaries and net salaries is an indicator that affects the creation of classes within the sector, in which we can have very high salaries for the highest positions and very low salaries for the lowest positions. The existence of this significant difference can create uncertainty for the sector in general since the lack of a stable structure is observed and the spirit of inequality among employees can also be felt. This difference can reflect negatively on the motivation of employees who have low salaries.

Table 2. The 5-number summary for all variables

Variable	Min	P25	Median	P75	Max	Mean	Std.Dev	Variance	Skewness	Kurtosis
capital	158100	307500	309600	329398.5	4.43E+07	1005817	3402809	1.16E+13	7.834369	82.82148
assets	96778	2481992	8818422	33553264	878418968	5.09E+07	1.21E+08	1.46E+16	3.91E+00	2.01E+01
liabilities	2622	419974	1785836	6702362	747090664	1.49E+07	6.10E+07	3.73E+15	8.87E+00	9.26E+01
employee	1	3	7	22	419	22.33144	46.88369	219.08	5.472857	40.14876
income	307500	5336890	1.82E+07	6.12E+07	1.70E+09	8.38E+07	2.06E+08	4.23E+16	4.77E+00	2.94E+01
profit	-2.59E+07	65466	758867	4258077	1.25E+08	6707474	1.73E+07	2.99E+14	4.04E+00	2.24E+01
gsalary	12853.75	40273.08	60875.53	94462.7	242512.5	74803.02	45967.36	2.11E+09	1.308582	4.338055
nsalary	8039.42	24439	37918.23	55220.59	143834.8	45000.34	27966.16	7.82E+08	1.393224	4.705378

The statistics for the income variable show that there are some companies that have very large incomes compared to most other companies. This distribution can cause a small number of companies to be more dominant in the market and create inequality in this industry. Through these values, an uncertain and unequal environment between companies in the IT sector in North Macedonia is observed. The negative impact of this can be seen in the overall competition by hindering the growth of companies with low incomes and strengthening dominant companies.

The profit model of companies shows the existence of large discrepancies in financial performance among companies in this sector. There are companies that have generated relatively low profits, and on the other hand there are companies that have recorded very high profits. This may occur as a result of the influence of several factors such as diversification of services, operation in global markets, company size or invested foreign capital. Such a situation negatively affects the long-term sustainability of this sector by hitting competition so that small companies will face the fight for survival. In this case, support policies for small companies will be needed.

The statistics for capital show that most companies are relatively wealthy. The high value of the standard deviation shows that there is a lot of variation in the capital of companies. High values of Skewness for the capital of companies suggest that the majority of companies have relatively low levels of capital, while a portion of companies possess disproportionately

high capital. Similarly, high values of Kurtosis suggest high capital inequality among companies within the sector. Such a situation may be the result of several factors such as the changes present in the ownership structure, access to entrepreneurial capital or as a result of foreign direct investment. This imbalance affects the market by creating innovative potential for richer companies, while creating challenges to compete and invest for poorer companies. Such results suggest long-term instability in this sector by limiting competition and limiting new market entries.

Through the analysis of the assets of the companies, a positive skewed distribution is found, which indicates that the majority of companies possess modest levels of assets, while a small number of companies possess high levels of assets. The presence of extreme values suggests that we deal with some large companies that are the result of foreign investment, which operate for a long time in the market or have diversified services. Such inequality may affect the inequality in access to financial resources and thus reflect the competitive ability and innovation in the entire industry.

The statistics for liabilities show that there is an asymmetric distribution and a positive slope of liabilities among companies. This situation is the result of the fact that while many companies have low liabilities, a small number of companies maintain very high levels of financial liabilities. This occurs due to reliance on external financing, aggressive expansion strategies or long-term investment commitments. High debt levels in firms can destabilize employment and threaten industry continuity, especially during economic downturns.

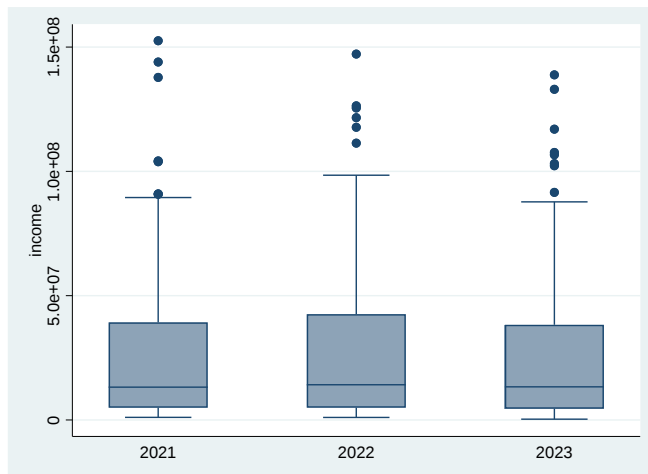
The values for employees where standard deviation compared to the average shows that there is a wide distribution of the number of employees. There is a positive distribution as a result of the value of Skewness which implies that most companies employ a relatively small number of workers, while some others have a very large number of workers. The high value of Kurtosis suggests the existence of dominant companies in the market, large companies with considerably high foreign capital which employ many IT professionals, while on the other hand small firms carry out this activity with a small team. This distribution affects the creation of an imbalance in the structure of the IT market, where as a result of the small number of dominant market players, the stability of the workforce may be at risk if an economic shock occurs, while on the other hand for small companies it is necessary to support and diversify the workforce.

The values presented about gross salary show that there is a large distribution of gross salary between companies. The high value of the variance shows that there is a high variability of gross salary. High values of Skewness and Kurtosis indicate the existence of a large gap between employees, which suggests structural inequality and a large influence from outliers or large companies. Therefore, the gross wage market in North Macedonia is not homogeneous and it is necessary to pursue policies for wage transparency, or to create incentives for building the capacities of smaller companies in order to be able to compete better in the labor market.

The values for net salary show that there is a large distribution of net salary between companies. A high value of Skewness indicates that most employees in the respective companies receive salaries below the average and a small proportion of employees receive significantly higher salaries. Similarly, a high value of Kurtosis suggests that net salaries are densely concentrated around the average and there are some extreme values, which suggest positions that are paid very commonly in those companies that are integrated into the global market. The overall situation suggests an uneven salary structure within the sector and may be driven by differences in job roles, qualifications, level of experience and operation in international markets of some companies.

Because the initial statistics were heavily influenced by outliers, in order to ensure the accuracy and reliability of our analyses, we applied the IQR (outlier elimination) method. Through this process, we can identify and remove problematic data that may negatively affect the statistical results. After removing the outliers, we created new boxplots that ensure that subsequent analyses for the relevant variables accurately reflect the distribution of the data and for each variable show their trends and characteristics.

Figure 1. Box plot of income distribution over the years 2021-2023



As we can see from figure 1, the similarity of the boxes and the median of the incomes are at similar levels for all three years, which suggests that the economy of this sector has remained stable over the three years or perhaps there has not been any major change in business activities that would significantly affect revenues. We note considerable differentiation and wide distribution of revenues. There is a clear trend that some companies, compared to most other companies, have exceptional performance which may be a result of the diversity of the services they offer, or expansion into global markets, but this situation suggests the existence of an uneven environment in the IT sector market, where for small companies that may struggle to survive, supportive and balanced policies are needed across the sector.

Figure 2. Box plot of profit distribution over the years 2021-2023

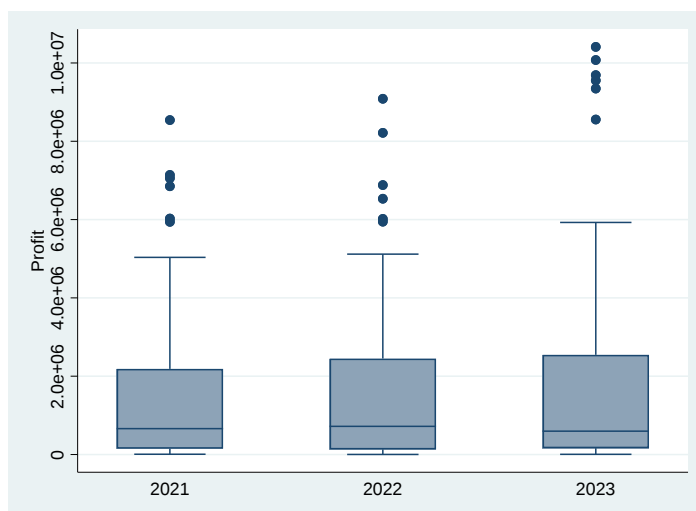
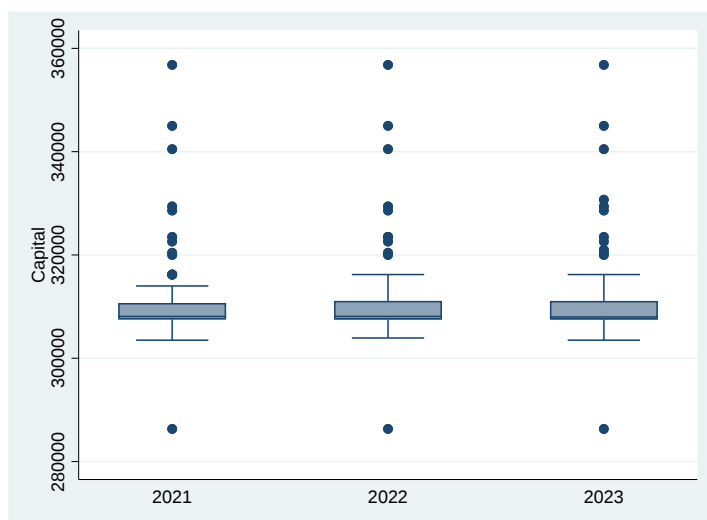


Figure 2 shows that the median has not changed significantly over the past three years, indicating that the average profit has stayed roughly the same during this period. Analyzing the years 2021 and 2022, we see a relatively narrow distribution of profit which suggests a similar level of company performance and also suggests stability in the economic environment of this sector. In particular, in 2023, the extreme values show that some companies have had extraordinary profits, while others have very low profits. This pronounced inequality shows that profit is concentrated in a few large companies, which have generated extraordinary profits which have been influenced by innovations, diversification of services or expansion of operations in different markets. This situation suggests the development of policies that will help improve competition and support small companies to generate greater profits.

Figure 3. Box plot of capital distribution over the years 2021-2023



As can be seen from the graph in figure 3, during the years 2021-2023, the capital of companies is homogeneous and there are similarities in the capital levels of companies, and the sector is operating in equilibrium. The presence of outliers indicates that some companies may have extraordinary capital as a result of large investments, expansion of their operations in global markets or the creation of strategic partnerships. The ability of companies that dominate the market to invest in new technologies or in research and development brings an inequality in the IT sector, which affects competition and creates barriers to the entry of new companies into the market, while for small companies there are obstacles to surviving in a competitive market.

Figure 4. Box plot of assets distribution over the years 2021-2023

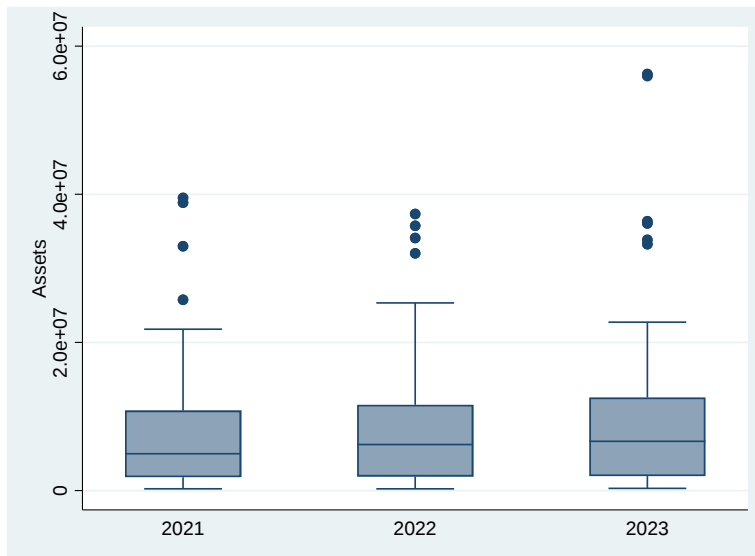
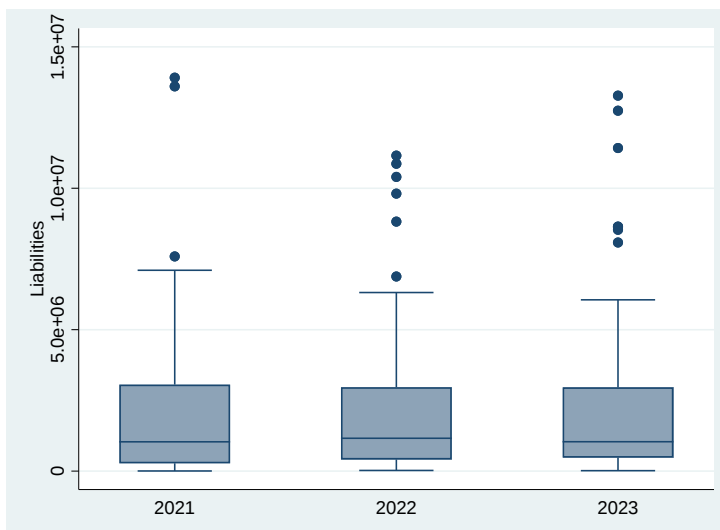


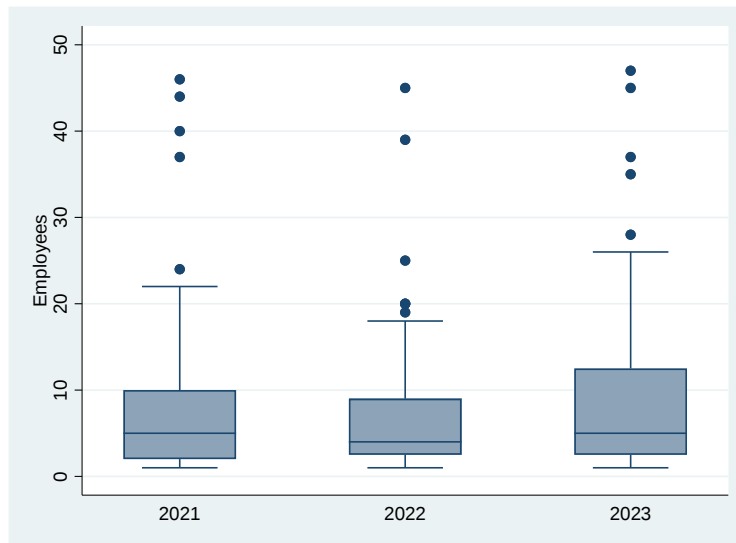
Figure 4 illustrates the asset distribution among companies, indicating a general stability where most entities possess comparable capacities. However, certain companies exhibit significantly higher assets, positioning them to potentially leverage these resources for technological advancements or infrastructure development. The capabilities of these companies hinder the growth of small companies and limit their ability to compete on equal terms.

Figure 5. Box plot of liabilities distribution over the years 2021-2023



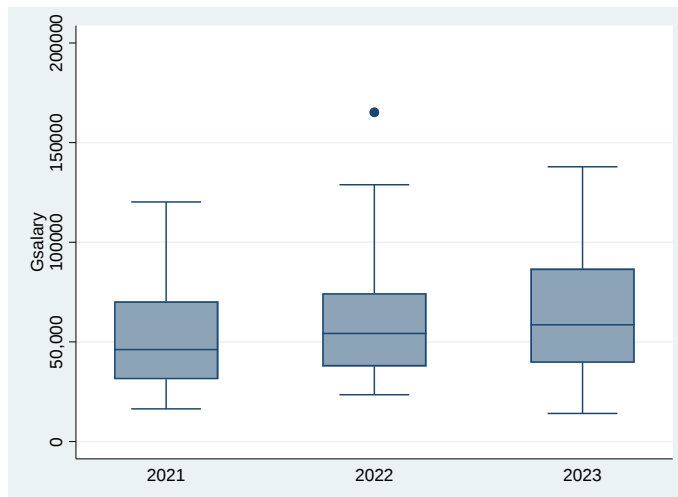
The liabilities graph in figure 5 shows that there is financial stability for many companies, since most companies have similar liabilities, however, the existence of extreme points indicates the existence of companies with very high liabilities, compared to some other companies. These companies may face financial risk, since holding high debt can have an impact on the long-term sustainability of the company which may lead to the bankruptcy of the company. In this situation, inequality in the sector may favor companies that manage financial debts well and make competition difficult for companies that have high debts. State and financial institution support can prevent these companies from going bankrupt.

Figure 6. Box plot of employee distribution over the years 2021-2023



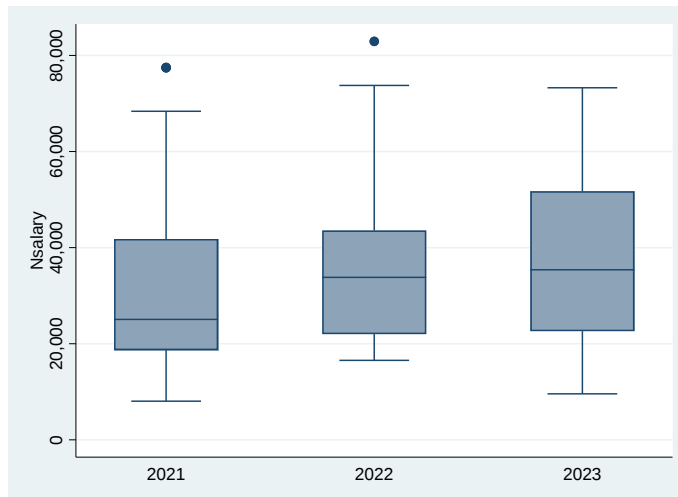
From figure 6, we see that there is a tendency for the workforce to be stable for most companies, however, outliers represent companies with a high number of employees which companies can increase the number of employees as a result of the growth of their activities and services. However, a rapid increase in the workforce can result in some problems that may be of the nature of proper qualifications and training which then affect the efficiency of operations. To ensure efficient operations and productivity, companies must invest in staff training.

Figure 7. Box plot of gross salary distribution over the years 2021-2023



From the graph in figure 7, we are dealing with a relatively stable distribution of gross salaries, however the presence of outliers in 2022 suggests the existence of companies that offer very high salaries compared to other companies. These companies usually have high performance, have an expansion of activities or make large investments. However, the high salaries offered by these companies can bring fluctuations in distribution and destabilize competition in this sector. It is suggested that small companies improve their salary policy if they want to employ professionals and not risk their sustainability.

Figure 8. Box plot of net salary distribution over the years 2021-2023



As can be seen from the graph in figure 8, we have an overall improvement in the level of net salaries in these three years, which may be the result of good compensation policies, increased demand for professionals or increased demand for various IT services. In 2021 and 2022, there are individuals who have benefited from exceptionally high salaries compared to others, which may occur as a result of various factors, such as specific qualifications, performance of specific services, companies operating abroad, strategic partnerships, high performance, etc. However, in such a case, inequality is created in the distribution of salaries. Companies should review their salary distribution policy, trying to ensure balance in employee payments.

To analyze the factors affecting the profit of IT companies in North Macedonia, linear regression (OLS) and panel data (FE/RE) models were used. The dependent variable was profit, while the independent variables included revenues, capital, assets, liabilities, number of employees, and gross salary. Initially, all variables were included in the OLS model to assess their impact on profit (dependent variable). The results showed that only a few variables were statistically significant: assets, liabilities and number of employees, while salary was not very significant. The presence of multicollinearity between income and salary was also identified, which justifies the modification of the initial model. Due to the high correlation, the income variable was removed, and the variables gross salary and net salary were merged into a single variable average salary. Even after the model modification, the new model maintained a high R-square (66.8%) and showed that the variables that had an impact on profit are assets, liabilities and number of employees.

```
. reg profit capital assets liabilities employees paga_mesatare
```

Source	SS	df	MS	Number of obs	=	353
Model	7.0262e+16	5	1.4052e+16	F(5, 347)	=	139.83
Residual	3.4873e+16	347	1.0050e+14	Prob > F	=	0.0000
				R-squared	=	0.6683
				Adj R-squared	=	0.6635
Total	1.0513e+17	352	2.9868e+14	Root MSE	=	1.0e+07

profit	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
capital	.0418727	.1819071	0.23	0.818	-.3159066	.399652
assets	.0772989	.0077381	9.99	0.000	.0620794	.0925184
liabilities	-.0819406	.013067	-6.27	0.000	-.1076412	-.05624
employees	201259.1	13739.33	14.65	0.000	174236.2	228281.9
paga_mesatare	9.498565	16.71143	0.57	0.570	-23.36988	42.36701
_cons	-1114357	1052221	-1.06	0.290	-3183891	955177.8

To address heteroskedasticity, we applied regression with robust standard errors, and the new model confirmed the statistical significance of assets, liabilities, and number of employees, while average salary remained non-significant.

Assets show a strong and positive impact on profit, which supports the literature and global trends, where investment in technological infrastructure affects profit growth.

The positive and significant impact of the number of employees suggests that in industries based on IT services, the increase in the workforce contributes to income growth and the creation of added value.

Liabilities have a negative but statistically significant impact, which suggests that large liabilities (debts) reduce the company's ability to generate profit.

Capital with a negative but not significant impact may be the result of the fact that the founders' capital is not a direct determinant of company profit.

The average salary, although positive but not statistically significant, suggests that salaries in the IT sector are standardized, without any major changes and do not have a significant impact on performance.

```
. xtreg profit capital assets liabilities employees paga_mesatare, fe
```

```
Fixed-effects (within) regression      Number of obs   =      352
Group variable: kompani_id             Number of groups =      125

R-sq:                                  Obs per group:
    within = 0.1411                      min =          1
    between = 0.5315                     avg =         2.8
    overall = 0.5212                     max =          3

corr(u_i, Xb) = -0.1167                  F(5,222)         =       7.30
                                          Prob > F          =      0.0000
```

profit	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
capital	-.017841	.1382072	-0.13	0.897	-.2902069	.2545249
assets	.1302504	.0241871	5.39	0.000	.0825846	.1779161
liabilities	-.1035498	.0318273	-3.25	0.001	-.1662722	-.0408275
employees	54625.88	65000.45	0.84	0.402	-73470.99	182722.7
paga_mesatare	18.43594	23.59908	0.78	0.436	-28.07093	64.94282
_cons	-717231.5	1970742	-0.36	0.716	-4600986	3166523
sigma_u	11687863					
sigma_e	4923438.7					
rho	.84929566	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(124, 222) = 9.71                      Prob > F = 0.0000
```

Due to the high value of $\rho=0.849$, we have a large variability between companies, so we say that the Fixed Effect model is appropriate.

```
. xtreg profit capital assets liabilities employees paga_mesatare, re
```

```
Random-effects GLS regression      Number of obs   =      352
Group variable: kompani_id         Number of groups =      125

R-sq:                              Obs per group:
    within = 0.1178                      min =          1
    between = 0.6556                     avg =         2.8
    overall = 0.6591                     max =          3

corr(u_i, X) = 0 (assumed)           Wald chi2(5)     =     261.80
                                          Prob > chi2      =      0.0000
```

profit	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
capital	-.0305706	.1301838	-0.23	0.814	-.2857261	.224585
assets	.088434	.0106454	8.31	0.000	.0675695	.1092986
liabilities	-.0864676	.0179921	-4.81	0.000	-.1217315	-.0512037
employees	173254.3	21083.96	8.22	0.000	131930.5	214578.1
paga_mesatare	17.43288	18.52639	0.94	0.347	-18.87818	53.74394
_cons	-1488403	1384764	-1.07	0.282	-4202490	1225685
sigma_u	9642445					
sigma_e	4923438.7					
rho	.79320193	(fraction of variance due to u_i)				

The high result of $\rho=0.7932$ indicates that 79% of the variance comes from differences between companies, not within them. So, this model also suggests that the differences between companies are large.

To choose between Fixed Effects and Random Effects models, we applied the Hausman test to select the optimal model.

```
. hausman fe re
```

Note: the rank of the differenced variance matrix (2) does not equal the number
be problems computing the test. Examine the output of your estimators :
coefficients are on a similar scale.

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fe	(B) re		
capital	-.017841	-.0305706	.0127296	.0464047
assets	.1302504	.088434	.0418163	.0217185
liabilities	-.1035498	-.0864676	-.0170822	.0262538
employees	54625.88	173254.3	-118628.4	61485.97
paga_mesat~e	18.43594	17.43288	1.003064	14.61811

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

```
chi2(2) = (b-B)'[(V_b-V_B)^{-1}](b-B)
        = 3.73
Prob>chi2 = 0.1552
```

Based on the results of the Hausman test, since $p\text{-value}=0.1552>0.05$, we have no reason to reject H_0 . We conclude that there is no systematic difference between the coefficients of the Fixed and Random Effects models. For this reason, we choose the Random Effects model, because the R-squared overall of the Random Effects model is higher (0.6591) than the R-squared of the Fixed Effects (0.5212), and which is more suitable for interpreting the data, offers higher efficiency, and maintains the correctness of the analysis.

CONCLUSION AND RECOMMENDATIONS

Through the analysis of data collected from over 100 companies in the IT sector in North Macedonia, a clear picture of the diversity and challenges faced by the relevant companies in this sector has been obtained, making it clear that there is a possibility of continuous growth of companies, but also that support for smaller companies is necessary in order to maintain financial stability and have continuous growth. The results of the analyzed variables, such as, for example, regarding profit, we have found that there is diversity among companies, where some companies have high profits, while some companies have encountered challenges in their efforts to achieve sustainable profit. We have found a wide distribution of the number of employees, where it is noted that some companies have a considerable number of employees, while others have a very small number of employees. Gross and net salaries have significant diversification between companies, but the trend of salary growth over the years is still evident.

The outputs of the regression analyses reflect a moderate sustainability of the IT sector in North Macedonia. This sustainability is the result of the positive relationship between assets and the number of employees with the overall profit of the companies, presented especially in the Random Effects model. On the other hand, the negative and significant impact of liabilities on profit raises concerns about the financial management of the companies where the largest number of companies have high debts, which hinders the long-term sustainability of this sector.

As for the companies, it is suggested that their focus be on improving financial management and increasing efficiency, focusing on the most advanced technologies and improving processes within the company, in order to ensure and maintain a sustainable profit.

It is suggested that IT companies continuously invest in assets, technological infrastructure (equipment, cloud technology, AI) in order to generate direct value. Efficient debt restructuring would be essential. Focus on attracting talent, another recommendation. Although the impact of the average salary is not statistically significant, or does not directly affect performance, qualitative analyses are recommended to see if salaries help in employee motivation, satisfaction and productivity.

In general, a significant potential of the IT sector in North Macedonia is observed, however, continuous government support is needed in order to improve the conditions and environment for investments in this field.

Also, due to the limitations of this study, it is suggested that future studies include the analysis of other variables such as other external factors to provide a clear picture of the factors that affect the performance of companies and the IT sector in general.

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